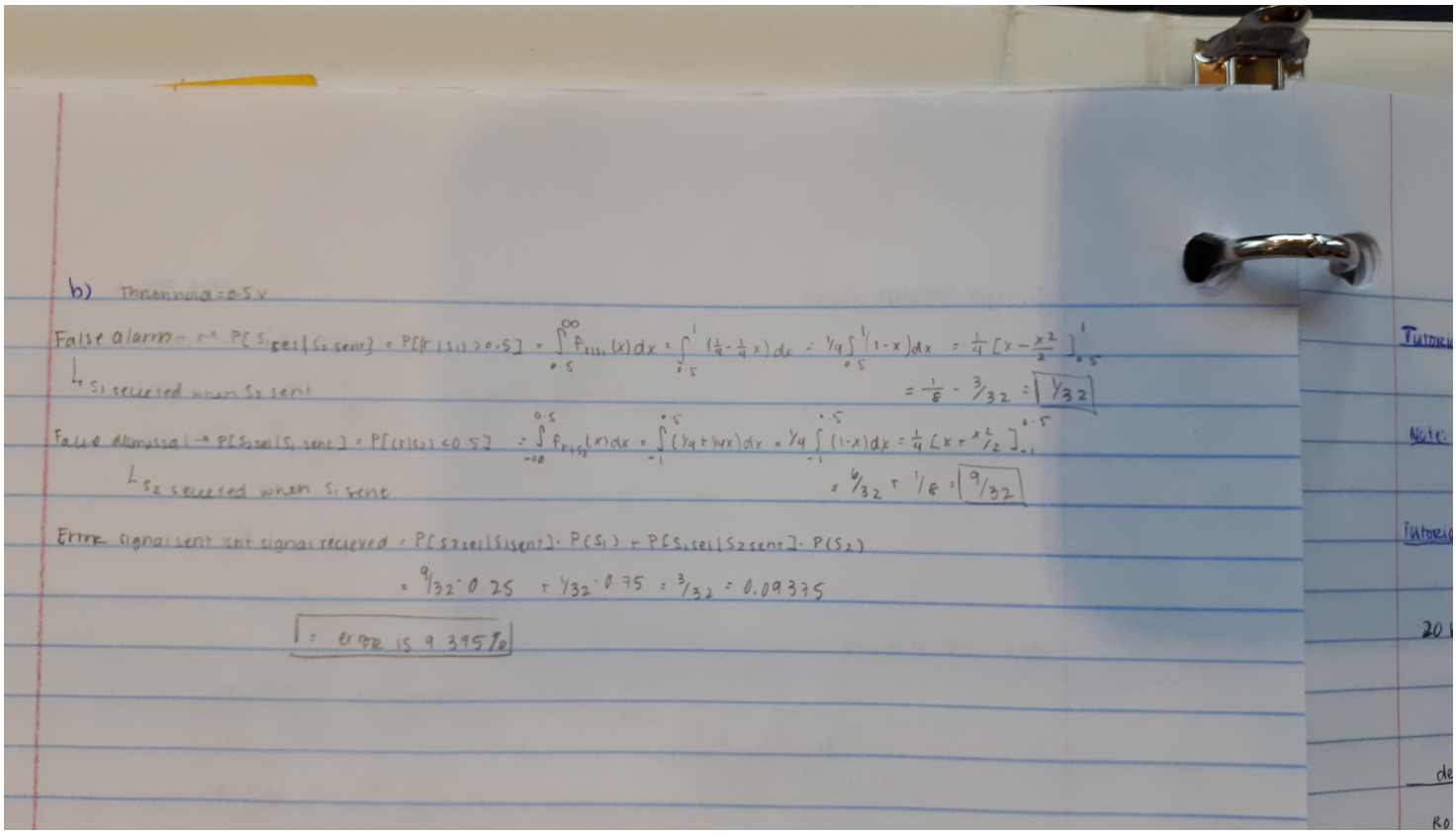

b) Threshold = 0.5 V

False alarm = $P[S_1 \text{ selected} | S_2 \text{ sent}] = P[r | s_2) > 0.5] = \int_{0.5}^{\infty} f_{r|s_2}(x)\,dx = \int_{0.5}^{1} (\frac{1}{2} - \frac{1}{4}x)\,dx = \frac{1}{4}\int_{0.5}^{1}(1-x)\,dx = \frac{1}{4}\left[x - \frac{x^2}{2}\right]_{0.5}^{1}$

$= \frac{1}{8} - \frac{3}{32} = \boxed{\frac{1}{32}}$

↳ S_1 selected when S_2 sent

False dismissal = $P[S_2 \text{ sel} | S_1 \text{ sent}] = P[(r|s_2) < 0.5] = \int_{-\infty}^{0.5} f_{r|s_2}(x)\,dx = \int_{-1}^{0.5} (\frac{1}{4} + \frac{1}{4}x)\,dx = \frac{1}{4}\int_{-1}^{0.5}(1-x)\,dx = \frac{1}{4}\left[x + \frac{x^2}{2}\right]_{-1}^{0.5}$

↳ S_2 selected when S_1 sent

$= \frac{6}{32} + \frac{1}{8} = \boxed{\frac{9}{32}}$

Error signal sent ≠ signal recieved = $P[S_2 \text{ sel} | S_1 \text{ sent}] \cdot P(S_1) + P[S_1 \text{ sel} | S_2 \text{ sent}] \cdot P(S_2)$

$= \frac{9}{32} \cdot 0.25 + \frac{1}{32} \cdot 0.75 = \frac{3}{32} = 0.09375$

∴ error is 9.375%